

Application of Economic Impact Analysis to a Local Public Health Agency and its "Academic Health Department"

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SYNOPSIS

Public health systems are stressed by increasing demands and inadequate resources. This study was designed to demonstrate how economic impact analysis can estimate the economic value of a local public health system's infrastructure as well as the economic assets of an "Academic Health Department" model. This study involved the secondary analysis of publicly available data on health department finances and employment using proprietary software specifically designed to assess economic impacts. The health department's impact on the local community was estimated at over \$100 million, exceeding the economic impact of other recently studied local industries with no additional costs to local taxpayers.

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Public health systems are stressed by increasing demands and inadequate resources.¹⁻³ Creating greater awareness of how public health programs and systems improve the quality and longevity of life will be an increasingly important element of a national strategy to gain support for public health.^{4,5} Awareness and support for public health will also be required at the local level, where communities increasingly need to choose among a wide range of competing priorities that impact quality of life. This competition for local resources will similarly require an expanded understanding of the importance of public health to local communities if public health is to compete successfully for finite funds.

Historically, public health's role in the reduction of morbidity and mortality through health promotion and disease prevention, as measured by death rates and the incidence and prevalence of a wide range of acute and chronic diseases, has been the primary focus for "marketing" the importance of public health. More recently, the role of public health in the reduction of health disparities and emergency and disaster preparedness has been emphasized. However, the economic value and contribution of public health programs and systems to local economies has been largely ignored, despite the increasing use of economic impact analysis to demonstrate the value of various industries and initiatives to local communities. Public health's potential contributions to communities include the capacity for local public health departments and systems to serve as important strategies and sources for revenue maximization that can support regional economic development.

This study was designed to demonstrate the potential value of a local public health system's infrastructure to a local economy by analyzing the direct, indirect, and induced economic impacts of a county health department. Despite the emergence and expanding scope of public health finance as a field of study within public health systems research,⁶ there is virtually no discussion of the economic impact of health departments on the economies of local communities. Economic impact analysis is a methodology commonly used to assess a wide range of other public and private sector programs, investments, and expenditures, e.g., tourism, higher education, sports, local health care systems, child care, airports, and agriculture.⁷⁻¹³ A positive economic impact, either assumed or documented, is an important criterion used for decisions related to recruiting industry and investments in local communities.¹⁴ The real or potential economic value of an industry to a community is also an important factor in the consideration of what community assets

will be invested in the industry, either through monetary contributions, tax incentives, or other sources of support. For example, the economic values of a range of specific "industries"—a large military base, a single football game, and cruise ships—were recently assessed in Jacksonville, Florida, the site of this case study. Despite efforts to enhance society's perceived value of public health,¹⁵ there is little evidence of the application of this commonly used economic assessment tool to public health systems.

This study had several purposes. The first was to describe a methodology for applying economic impact analysis to local health departments. The standard approach and proprietary software used in this analysis ensure that it can be readily performed by health departments nationally. It should be noted that this study looked at economic impact only. It did not examine the economic benefits of disease prevention and health promotion programs that relate to increased worker productivity, improved educational outcomes, reduced hospitalization, etc. The second and related purpose was to demonstrate the potential importance of this analysis to support national and local strategies to market public health.

The third purpose of this study was to analyze the specific contribution of a partnership between an academic institution and a local health agency to a local economy. As the model of the Academic Public Health Department evolves, a barrier to its development and diffusion is a perceived need to obtain financial resources to support the partnerships before trying to establish them. Providing an evidence-base for the potential economic benefits of academic institution-public health agency partnerships could help support and accelerate the development of the model.

METHODS

This study involved the secondary analysis of publicly available data with commonly used proprietary software specifically designed to assess economic impacts.

Sample and source of data

Data on health department revenues and expenditures for Duval County, Florida, and ten comparison counties in Florida (the five next larger and five next smaller counties) were abstracted from the Florida Department of Health (DOH) Intranet Contract Management Trend Report/Extract System¹⁶ and Financial and Information Reporting System (FIRS).¹⁷ These are the sources of financial data for Florida's Department of Health and all county health departments. Data on the number of personnel were obtained for each of

the eleven counties from the Florida DOH Intranet site.¹⁶

Analysis

A two-stage analysis using the above data was conducted using *Regional Economic Models, Inc. (REMI) Policy Insight®* Model.¹⁸ The *REMI®* model is designed to generate year-by-year estimates of the total regional macroeconomic effects of specific economic changes in a community. The economic model enables the user to interpret the estimated economic and demographic effects of a wide range of changes in the economy, for example, a proposed industry or policy initiative. The model is calibrated to regional areas for policy analysis and forecasting. Each calibrated area has its region-specific economic and demographic data embedded in the model. This enables and facilitates accurate policy analysis and forecasting on a local economy.¹⁸ The *REMI®* software is routinely employed by government agencies (including most state governments), consulting firms, nonprofit institutions, universities, and public utilities. *REMI®* economic and demographic model simulations have been applied to a wide range of initiatives related to economic development, transportation, infrastructure development, energy and natural resources, state and local tax structures, etc.¹⁹

The *REMI®* software manages data for a large number of economic variables and uses a series of complex formulas (“dynamic algorithms”) to compute economic impact. These formulas are described in-depth elsewhere.^{20,21} The software facilitates analysis of the economic impact of specific interventions through simulations that allow for changing one or more of the model’s policy variables (pre-loaded independent variables). The analysis then reflects the overall changes caused by the intervention (dependent variables), as well as the impact in one or more of the 70 economic sectors of a regional economy. The changes in the regional economy (dependent variables) resulting from the changes in the policy variables (independent variables) are inferred as the economic impact of the intervention.

In conducting an economic impact analysis of a new industry/initiative, assumptions regarding a wide range of variables, such as changes in employment and demand generated by the industry, are loaded into the software program to estimate the impact created by the economic change. In this case, the interventions being studied, the Duval County Health Department (DCHD) and the DCHD academic partnerships, were already in place. Consequently, the approach used to assess the economic impact of the DCHD and its academic-agency partnerships was to measure the impact

on the economy resulting from the removal of specific economic assets of the DCHD and the academic partnerships. Rather than assumptions concerning new jobs that might be associated with a new industry, actual data on existing jobs and other expenditures were deducted and the (negative) changes in the aggregated regional economy were calculated as the economic impact.

Economic impact of the Duval County Health Department on the local community

The model simulation was created by adjusting three of the model’s policy variables: Industry Employment (the number of DCHD and DCHD academic partnership employees), “Wage Bill” (a *REMI®* policy variable that adjusted the model’s default salary assumptions to known salaries and then converted the adjustment to employee equivalents), and Industry Exogenous Final Demand (goods and services purchased by DCHD). Data on employment and other expenditures were compiled from DCHD personnel and financial datasets. These data were then loaded into the *REMI®* software to compute the economic impact by subtracting the respective amounts from those economic sectors. The analysis yielded an economic impact of the health department by computing the net effect on the regional economy by subtracting DCHD employees and expenditures from the regional economy.

Economic impact assessment of the health department’s academic partnership

Determining the contribution of the health department’s academic partnerships to the overall economic impact of the department was considerably more complex. The expenditures associated with the academic partnership component of the DCHD needed to be computed before the *REMI®* software could be used to compute the economic impact. The following describes the process assumptions for calculating the Academic Health Department expenditures.

1. The 10 counties closest to Duval County in terms of population were identified for comparison, stratified by the five next smaller and larger counties. These include the smaller counties of Seminole, Lee, Volusia, Brevard, and Polk, and the larger counties of Orange, Pinellas, Hillsborough, Palm Beach, and Broward. The mean of the annual expenditures for the 10 closest county health departments was then computed for the years 1988 through 2004. Annual expenditures of the DCHD and the means of the annual expenditures for the 10 comparison counties were then graphed to compare their respective growth.

2. As a second benchmark for comparison, regression analysis was used to compute the projected growth in expenditures for the department post-implementation of the academic partnerships if it continued at the same rate of growth as during the five years prior to the implementation of the partnerships. Expenditures were graphed to assess the differences between DCHD actual revenues/expenditures and projections if the partnerships did not exist.
3. Revenue data were also obtained and graphed by source to compare growth rates from the different sources of revenue.
4. The number of full-time equivalent employees (FTEs) in the health departments in Duval and the comparison counties over the past 10 years was graphed to compare the growth rates of the DCHD with the comparison counties.
5. *REMI*[®] software was employed to estimate the economic impacts of the DCHD academic partnerships on the Northeast Florida region using revenue and personnel data for what the health department's assets would be without the academic partnerships. A new model simulation was created by adjusting three of the model's policy variables: Industry Employment, Wage Bill, and Industry Exogenous Final Demand. To estimate the economic impact of the academic partnerships, 275 local health department jobs

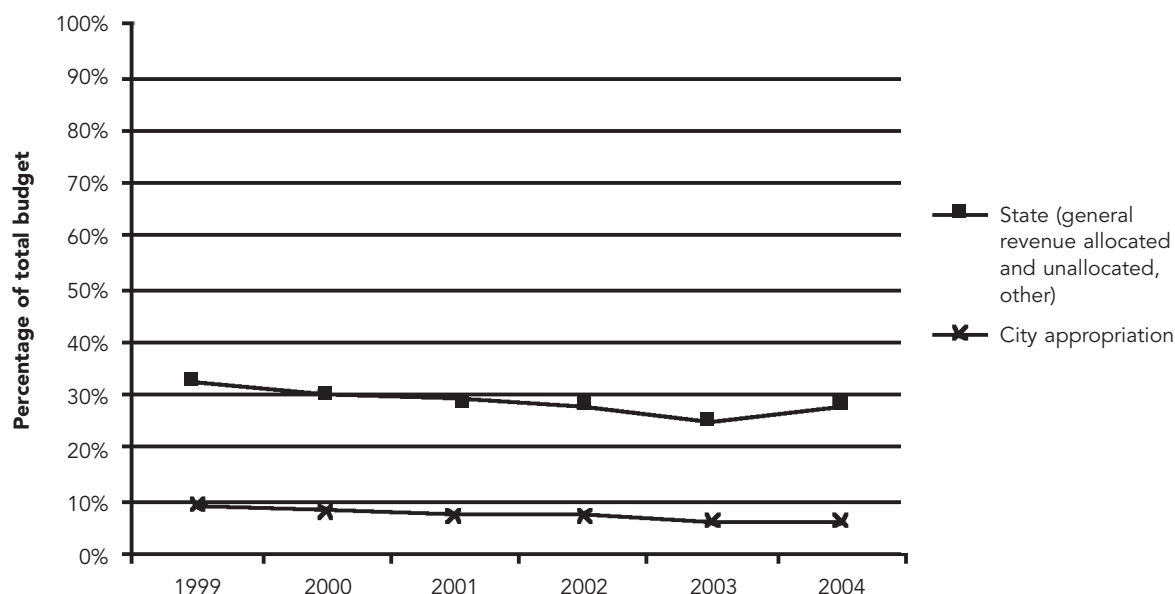
in six different categories were subtracted from the local economy. This specific employment number was determined after a comparison of Duval and Orange County Health Departments for each of the six categories of employment. Orange County was selected as the county most similar to Duval in terms of demographics, size, and the presence of one large metropolitan city in each county (Orlando in Orange County and Jacksonville in Duval).

RESULTS

Overall

The relative contribution of local and non-local sources of a health department's revenues is one objective measure of its economic benefit to a local economy. In a period of time when increasing demands are placed on local communities to finance services without previously available state and federal support, this measure provides evidence for the importance of public health and local investment in it as a strategy for economic development. Local and state tax support for DCHD remained constant or decreased during the period of this study. Figure 1 shows the changes in the proportion of DCHD revenue that is received from the city/county and state (general revenue). Both sources of revenue have remained essentially static over the past decade, and have decreased substantially as a percentage of the total DCHD budget. The city/county revenue support

Figure 1. City and state government funding of Duval County Health Department annual operating budget as a percentage of the total budget, 1999–2004



dropped to less than 10% of the budget in 1999 and has continued to decrease.

The percentage of funds supplied by the city and the state to the DCHD is particularly revealing in comparison to national data that show that local governments provide 44% and state governments 30% of funding on average to their local health department budgets.⁴ This national average of 70% of city/state revenue sources for local health departments compares with less than 35% of city/state contributions to the DCHD. Figure 2 shows the actual DCHD budget that is provided by city and state (categorical and noncategorical) revenue compared with the total budget, including grants and clinical services. Figure 2 shows that while the total budget for the Duval County Health Department has consistently increased year after year, city and state appropriations have remained relatively constant, which means DCHD has increasingly relied on funding from other sources from 1999–2004.

The *REMI*[®] analysis calculated the DCHD's contribution to the local economy by subtracting the current contributions made by the health department as a whole. The health department's total budget was \$49.6 million for Fiscal Year 2005. (Constant 2004 dollars were used throughout the study). When the indirect and induced effects of this budget were calculated by the software, the economic impact to Duval County increased substantially. The software calculated a "multiplier effect" of 2.1. Consequently, Duval County's

Gross Regional Product (GRP) would decrease by \$98.7 million in 2006, \$103.8 million in 2008, and \$106.7 million in 2010 if DCHD expenditures were removed in total from the local economy. Much of this impact would be due to lost employment. When computing both the direct and indirect impact on employment, a total of 1,467 jobs are supported by the Duval County Health Department. Almost all of the economic effects are in Duval County, with minimal impact on the adjacent counties. Table 1 shows the economic impact if the Duval County Health Department were to go away, in dollars and employment based on the projected regional economy for six years, starting in 2005. Conversely, we can view this table as the economic impact of DCHD on the local community in future years. In 2006, DCHD is expected to have a direct and induced economic impact on Duval County of \$98.7M. It will also be responsible for the employment of 1,767 people; less than half of those employees are actually employed by the health department.

Academic partnership impact

The health department programs were separated into academic partnership programs and core programs (found in most other health departments in Florida). Based on the comparison of Duval County with Orange County, an additional 275 DCHD jobs in Duval County were attributed to the extensive academic partnerships. About 75% of these additional 275 academic

Figure 2. Comparison of local and state contributions to total Duval County annual operating budgets, 1999–2004

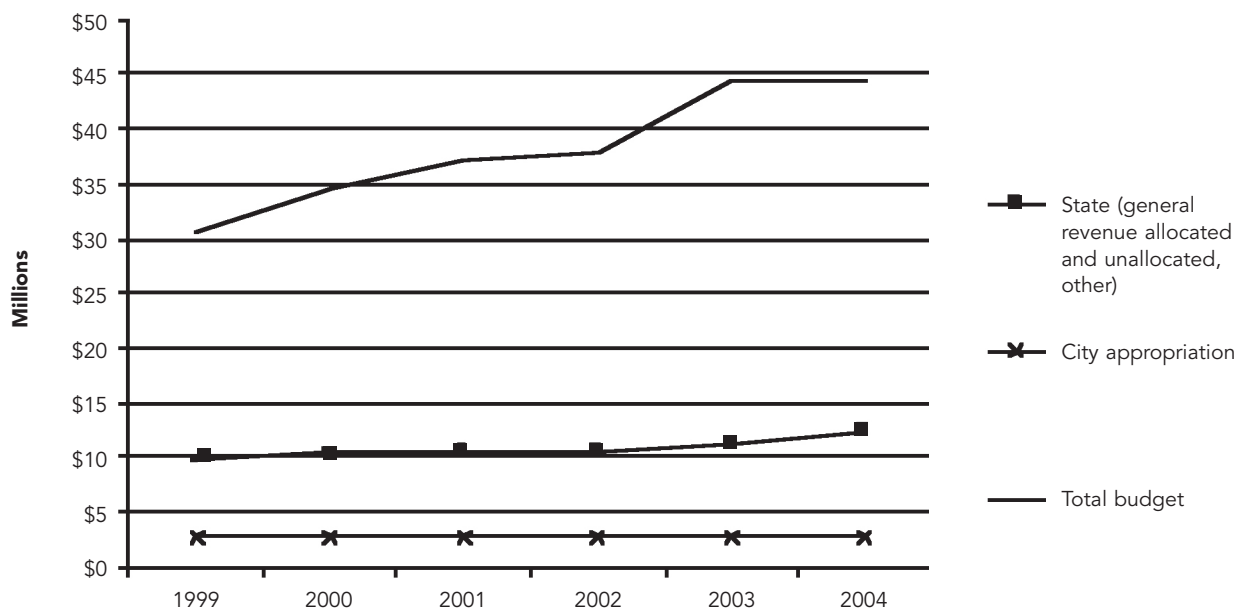


Table 1. Projected economic loss without DCHD (non-cumulative annual differences without DCHD)

Variable	2005	2006	2007	2008	2009	2010
Gross Regional Product ¹	−93.9	−98.7	−102	−104	−105	−107
Employment ²	−1,442	−1,467	−1,479	−1,477	−1,469	−1,461

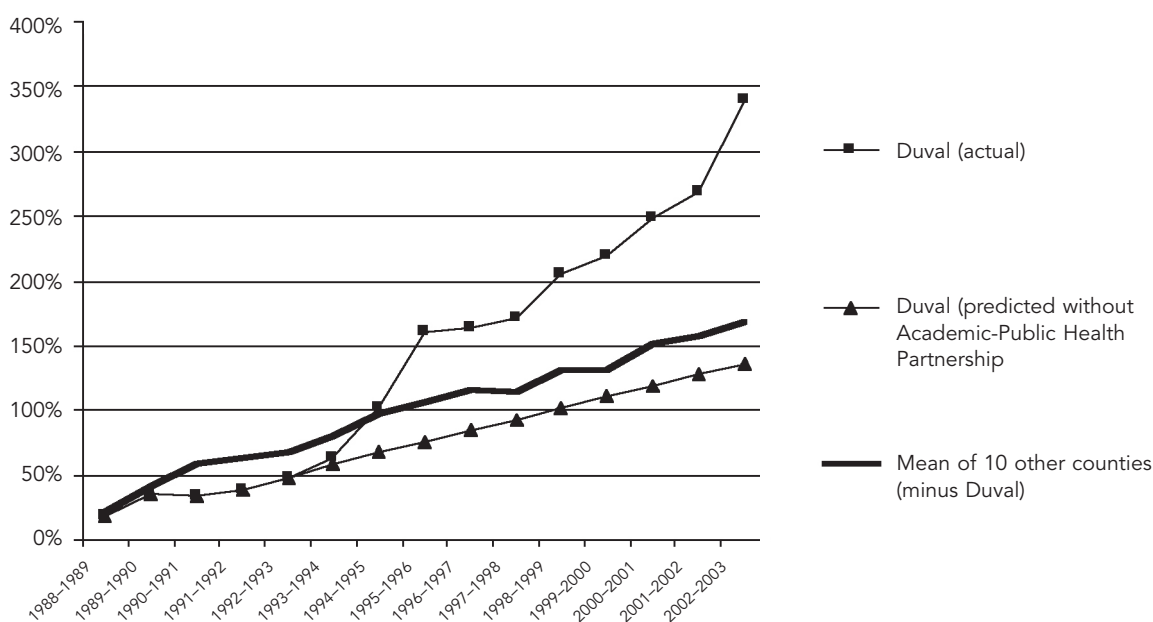
¹Millions of constant dollars (2004\$)²Number of jobs

SOURCE: Northeast Florida Regional Council using REMI® model

partnership jobs, including physicians and researchers, had relatively high salaries, requiring adjustment of the model's default data for salaries (*REMI*®'s Wage Bill variable). Finally, approximately \$7.2 million of the Duval County Health Department's annual expenditures in five different categories was subtracted from the local economy, as these were additional dollars generated by the academic partnerships that could not be attributed directly to the salaries of those 275 jobs. The direct economic impact of the department's academic partnerships was estimated to be \$22 million and 275 FTEs. The direct economic impact of the department's core programs was estimated to be \$27.6 million and 487 FTEs.

A comparison of DCHD's growth in expenditures to the growth of the mean of a stratified sample of the 10 closest counties in size to Duval County over the past 12 years shows that the DCHD fiscal resources increased

at a much faster rate than other counties after the Academic Health Department model was introduced (see Figure 3). Comparison of the growth of the DCHD expenditures that would have been predicted over the past 12 years (based on the department's growth over the five years preceding the development of academic partnerships) to actual growth similarly shows that the DCHD's fiscal resources increased at a far faster rate after the introduction of the Academic Health Department model. DCHD's actual cumulative growth was 340%, compared with the mean growth of the ten closest counties (169%) and the predicted 136% growth based on regression analysis of DCHD expenditures for the five years prior to the implementation of the academic partnerships (Figure 3). Other county health departments with academic partnerships (most notably Palm Beach County) were included in the ten comparison counties. This minimizes the true impact

Figure 3. Cumulative growth rate in department budget from 1987 Duval actual, Duval projected and mean for 10 other counties

of academic partnerships that would have been demonstrated if Duval County was compared only to counties without academic-public health partnerships.

Most of the added revenue and expenditures attributable to the academic-public health partnerships are for personnel. These personnel include employment of people from the local community and recruitment and retention of people from outside the region. Those recruited into the region are generally professionals, e.g., physicians, social scientists, nurses, etc. In addition to these higher level professionals, numerous other support and mid-level professional staff have been employed as a result of these partnerships. Figure 4 illustrates the growth in DCHD and Orange County Health Department personnel compared with the mean number of personnel employed by county health departments for the 10 counties closest in size to Duval. In terms of full-time equivalents (employees) DCHD also has nearly twice as many employees as the county of most similar size, albeit larger, Orange County. In 2000, Duval had approximately 780,000 residents, while Orange had 900,000. Both also have a large metropolitan city, Jacksonville and Orlando. FTEs increase significantly more than Orange County and the average of 10 other counties, starting around 1995.

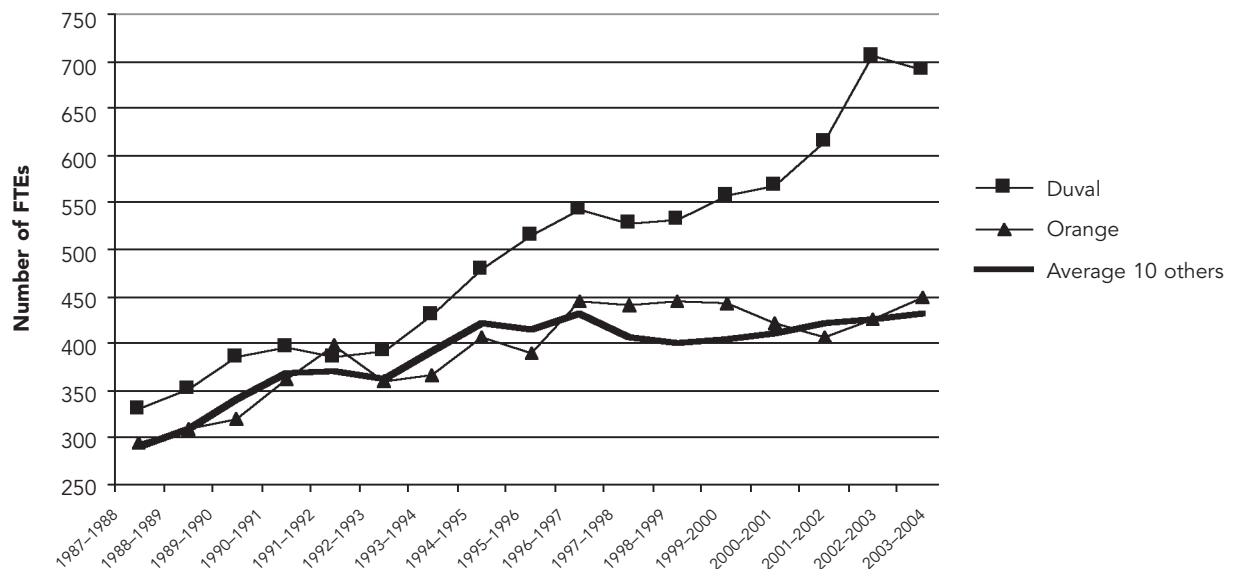
When the indirect and induced economic effects of the academic partnerships are calculated using the *REMI*[®] software, the direct economic impact is increased substantially by the multiplier effect. The full economic impact (direct, indirect, and induced)

of the academic partnerships generates a total of 585 jobs, as compared to 882 jobs supported by the Health Department's core programs. A Gross Regional Product of \$41.8 million can be attributed to the partnerships, with another \$62.0 million attributed to the Health Department's core programs. Table 2 projects decreases in economic activity in Duval County as measured by Gross Regional Product (a commonly used measure of economic impact/activity) and employment, if the assets of the academic partnerships were removed from the economy. Table 2 is comparable to Table 1 in that it assesses the overall economic impact of the Academic Partnership alone (not the entire Duval County Health Department). Without this partnership approach to public health, the local community would lose nearly \$40 million and 585 jobs in 2006.

DISCUSSION

The economic impact of the DCHD on the local economy is substantial. Compared with other contributions often cited as important to the economic health of the region, it nearly exceeds the combined annual economic impact of the cruise ship industry in Northeast Florida (\$36 million), the Florida-Georgia football game (\$20 million), and the Gator Bowl (\$56 million). In addition to the tangible monetary resources generated by the department, it also generates other less tangible, but no less important, social and intellectual capital in the community. Perhaps most

Figure 4. Number of full-time equivalents (FTEs) in Duval County vs. Orange County and average of 10 most similar counties



**Table 2. Projected economic loss without DCHD academic partnership
(Non-cumulative annual differences without DCHD academic partnership)**

Variable	2005	2006	2007	2008	2009	2010
Gross Regional Product ¹	−37.9	−39.8	−41	−41.8	−42.3	−42.9
Employment ² 000	−575	−585	−590	−589	−586	−582

¹Millions of constant dollars (2004\$)²Number of jobs

SOURCE: Northeast Florida Regional Council using REMI® model

importantly, it contributes to the community's health and well-being and overall quality of life. As previously mentioned, the economic impact of improved health outcomes from the department's programs, including those attributable to the academic partnerships in particular, were not included in this study. Also not included were increases in local economic assets that have resulted from the collaboration of DCHD academic staff with other public, private, and academic sector organizations. These assets have accrued in the form of numerous grants and contracts amounting to millions of dollars. These increases in revenue were achieved by leveraging more non-local funds each year for the same amount of local tax dollars.

The Duval County Health Department provides an example of a highly developed Academic Health Department.^{4,21,22} It has a large number of university faculty (32) from several institutions contracted to serve in full-time DCHD positions. This university faculty expands the local public health system's capacities to fulfill core and essential public health functions. They also generate resources that would otherwise not be accessible to the department and community. Generating the resources to sustain this model academic-public health partnership requires an entrepreneurial approach to public health management, particularly related to the provision of reimbursable services and the generation of program and research grants. The comparison of this Academic Health Department model with traditional approaches to developing public health infrastructure requires acknowledgement of the entrepreneurial and resource generating nature of the innovation as a necessary foundation. Opportunities for providing reimbursable primary care and specialty clinical services were expanded substantially by the academic partnerships. Nationally, local health department involvement in clinical services has been declining with some notable exceptions.²³ Previous experience in Jacksonville indicates that it was unlikely that these services could have expanded without attracting and retaining highly qualified staff through the academic affiliations.

The partnerships also enabled the health department to attract academic faculty into the region who could support and enhance the department's capacity to obtain grants and contracts. This has both expanded the community's professional resources, and the city's capacity to obtain external fiscal resources. As previously noted, though not included in this study, faculty members also contributed to the acquisition of substantial external resources for and through collaboration with multiple community-based organizations, academic institutions, and government agencies. These increased revenues support research, training, and expanded clinical and public health services. The academic partnerships without the development of an entrepreneurial environment would not have been effective in increasing the economic impact of the department.

The economic impact study was limited to the business aspects of the health department, such as employment, leases, equipment rental, supplies and equipment purchases, etc. The economic consequences of more productive lives due to better health were beyond the scope of this study. While these health impacts could have profound economic effects, both directly to citizens through disease prevention and health promotion, and indirectly to the community and local business by providing a more habitable and safe environment, the complexity and the need for potentially speculative assumptions for a more expanded study could have undermined the basic findings concerning the department's positive economic value.

The study was also limited to an analysis of economic value from a local perspective. From a state or national perspective, the growth of the DCHD may be considered negatively, as the local health department (DCHD) has been able to access substantial increases in state and federal funds on behalf of local citizens. For example, the DCHD has an extensive mobile dental program for providing dental sealants for children from low income families that is substantially supported by Medicaid. Federal and state funds pay for these services without additional costs to local taxpayers. If all local

health departments had similar programs, it could be viewed by state and federal agencies as a resource burden. Local interests may compete with state and national interests in this manner, but ultimately local public health officials are responsible for generating and/or accessing resources to protect and promote the health of local citizens and visitors.

Expanding local capacity to access and use resources to prevent disease and protect and promote health could result in greater societal expectations for and commitments to public health. The potential for this reordering of priorities in a broad societal context would be a positive outcome from the perspective of those who value public health at the state and national levels. Determining the economic value of local health departments from state and national perspectives would require not only the inclusion of the value to local individuals and communities, but also the value to the health and well-being of individuals and business beyond local borders in the context of a system of national and global public health services.

The analysis presented here has implications for the emerging field of public health finance. Public health finance is a relatively new field of study and is being conceptualized as a component of public health systems research.⁶ It has been defined as the field of science and practice that deals with financial resources advancing the health of populations through prevention and health promotion.²⁴ The field of public health finance is evolving primarily with an emphasis on national and state perspectives. With only a few exceptions, it has not yet expanded its focus to inform local public health system development.²³ Given the critical role played by local public health departments in state and national systems of public health (Institute of Medicine), the field of public health finance needs to advance in ways that will support the development of local public health departments. This study provides an example of how this field of study can support the development and maintenance of local health departments.

The expanded capacity to generate revenue resulting from implementation of academic-public health partnerships, as demonstrated in this study, illustrates both the value of agency-academic institution collaboration and the value of public health systems infrastructure to local economies. Regional planning bodies, agencies with the capacity to conduct economic impact assessments, are another important partner in the public health system. These agencies can assist local health departments in developing their public health system's financial assessment capacity, as they can provide both access to software and experience with conducting economic impact assessments.

This study also has important implications for public policy as it relates to the relationship between federal, state, and local governments. As accountability and responsibilities for funding programs and services are shifted from federal and state to local governments and communities, innovative approaches for financing them will be required if current programs are to be sustained and others developed in the future. Strategies to advance revenue maximization will be necessary to ensure increasing revenue flows into communities as devolution expands.²⁵ In addition to traditional measures of program outcomes and their value to communities, the assessment of the direct and indirect macroeconomic impact of programs and services will be necessary to provide comprehensive program analyses to decision makers. Given the challenge of measuring the value of public health interventions, which often are not realized for decades after the interventions occurred, economic impact assessments of the value of public health could increase public appreciation of the importance of public health to communities. In addition to traditional measures of program outcomes and their value to communities, the assessment of the direct and indirect macroeconomic impact of public health systems' infrastructure will be necessary to provide comprehensive program analyses to decision makers.

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